Abstract

An electromagnetic valve comprising a housing having a fluid containing region and first and second ports in communication with the region, an electromagnet carried by the housing located external to the fluid containing region of the housing, and a barrier in the form of a thin diaphragm of fluid impermeable material which hermetically isolates the electromagnet from the fluid containing region. An armature is movably positioned in the region and has a pole portion located for magnetic attraction by the electromagnet and has a plunger portion provided with a valve formation for opening and closing one of the ports to place both ports in fluid communication through the fluid containing region of the housing in one control state of the valve and to block fluid communication between the ports in another control state of the valve. The armature is moved from a rest position through a forward stroke when attracted by the electromagnet to change the control state of the valve, and the armature is moved by a biasing spring in an opposite direction through a return stroke back to the rest position. The armature pole portion occupies a major amount of the fluid containing region in which it is located, has a lateral dimension several times greater than the longitudinal dimension thereof and is of a material selected to achieve a desirable balance between fluid compatibility and magnetic properties for rapid and effective valve operation. Passages in the barrier and the armature pole portion allow the rapid valve movement and accommodate bubbles in the fluid, the armature is provided with structure for effectively guiding the same and a valve seat structure resists fluid leaks. A magnetic circuit is defined including the electromagnet, the armature pole portion, a portion of the barrier and a gap between the pole portion and the electromagnet located in the fluid containing region of the housing and external to the electromagnet. The gap is closed in response to electrical energization of the

electromagnet to move the armature and change the control state of the valve. The valve is made electrically and magnetically efficient by minimizing the total gap within the magnetic circuit, by having the pole face area relatively large on the armature pole portion and by having the electromagnet include a coil on a core of relatively small diameter.

REJECTION OVER 250 WORDS